

## Solar Generator



NASA's Jet Propulsion Laboratory (JPL) has played a leading role in several facets of the national solar energy development program, a cooperative effort of NASA and the Department of Energy (DoE). One JPL project (1979-81) involved development of a test bed Solar Parabolic Dish-Stirling Engine System Module. The "dish" was a mirrored solar concentrator that reflected solar heat to an engine/generator, which converted the heat to electricity. The generator was an adaptation of a Stirling external combustion engine, developed in part with NASA/DoE funding and in part with private funding by United Stirling AB, Malmo, Sweden.

Successfully tested at Edwards Air Force Base, California, the JPL/United Stirling test system provided a departure point for a more advanced Vanguard I dish-Stirling module program initiated in 1982. Shown in the accompanying photo, the Vanguard I module is a commercial prototype erected by Advanco Corporation, El Segundo, California at Southern California Edison (SCE) Company's Santa Rosa Substation in Rancho Mirage, California; the program is jointly funded by Advanco, United Stirling SCE and DoE. The module combines the JPL mirrored concentrator technology, an advanced Stirling Solar II

engine/generator, and a low-cost microprocessor-controlled parabolic dish developed by Advanco; 36 feet in diameter, the dish automatically tracks the Sun throughout the daylight hours, producing solar heat of more than 1,300 degrees Fahrenheit to generate 25 kilowatts. Tests began in 1984; they were to continue for a minimum of 12 months with the option of extending the test work and expanding the scope of the project. In one of the initial tests, Vanguard I accomplished a record 28 percent sunlight-to-electricity conversion efficiency. If tests prove the system effective and reliable, Advanco and SCE plan to construct a multi-module generating plant that would sell electricity to local utilities. They are considering large arrays of up to 1,600 modules generating 30,000 kilowatts.

In a related development, United Stirling has signed an agreement with McDonnell Douglas Corporation to develop, manufacture and market a similar 25 kilowatt module employing a Stirling Power Conversion Unit, a derivative of the Solar II engine, and a dish concentrator designed by McDonnell Douglas. The partnership plans generating facilities capable of producing 10,000 to 50,000 kilowatts by combining 400 to 2,000 modules.